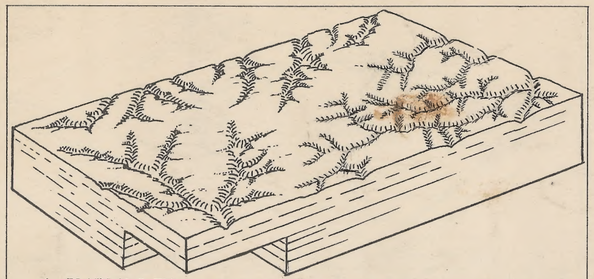
CONSTRUCTIONAL FORMS

EXPLANATIONS AND PROBLEMS Based on Accompanying Sheet of TOPOGRAPHIC MAPS SHOWING REPRESENTATIVE EXAMPLES



1. PLAIN. U. S. This map represents a region underlain by horizontal rocks. It is a plain. The streams have cut down below the surface of the plain about 200 feet. Much of the plain is still undissected. It is therefore not yet a mature plain. It is, however, well past the youthful condition, and may be called sub-mature. Attach a piece of cross section paper to the bottom edge of the map and draw a "projected profile" or skyline of this entire area, by projecting always the highest point on the map as seen from the south. Use a vertical scale of 1/20 inch = 100 feet. How great is the vertical exaggeration? Ans. _____ times. In which direction, if any, does the plain appear to slope? _____ What is the gradient of the streams on this map in feet per mile in the headwaters? _____ In their lower courses? _____ Complete the above diagram, without too much regard for the exact position and number of the streams. Subdivide the graphic scale to read thousands of feet. Do this by construction, not by mathematical calculation.

1 / 125,000

Single track Railroad
Fourth Class Road, not always passable
Strada campestre; Country Road
Strada mulatiera; Mule track
Tratturo; Wide road beaten by herds

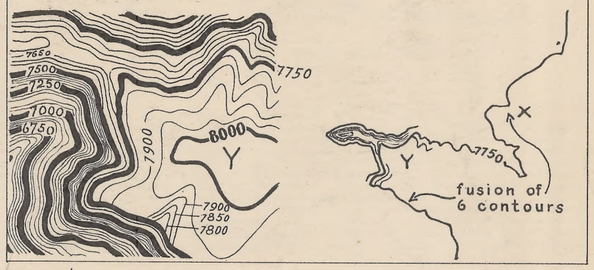
2. PLAIN. ITALY. This is a portion of the narrow coastal plain of eastern Italy. The topography is represented by both hachures and contours. A bit of the rugged oldland of complex rocks appears in the northwest corner, but the rest of the area is mostly unconsolidated sand and clay The plain slopes seaward toward the southeast from an elevation of 107 meters in the northwest corner of the area. How much is this slope in feet per mile? _____ In degrees? _____ Attach a strip of cross-section paper over this map and draw a profile from the northwest corner to the southeast corner, using a vertical scale of 1/20 inch = 50M. Compare this profile with that of the projected profile of the U. S. plain, above. What are the vertical exaggerations in each case? _____ Most of the roads and fields, as well as the minor ridges lie either parallel to or at right angles to the coast. There are some closely-spaced beach ridges near the center of the map, several being partly encircled by a contour line. What is the elevation of this contour? _____ Two streams have incised themselves 25M. or 75 feet below the level of the plain, which is otherwise undissected, and is therefore a young plain. The black line along the coast is a railroad which runs between a strip of low sand dunes and the water's edge.

The original of this map is printed in black although some editions of this series employ several colors. Note the various types of vegetation, shown by symbols, such as orchards, grasslands, marshes, and woods.

The meaning of several Italian words appearing on this map is as follows: **Lago Lungo** means Lake Lungo; **Bosco il Pineto** means The Pine Woods; **Cas.o della Principessa** means Casino etc.; **C. Ciciarella** means Casa or house (prob. farmhouse) of Ciciarella; **B. il Cipolluzzo** means Bosco or woods of; **M.a Tartarette** means Masseria or farm of; **P.te del Re** means Ponte or bridge del Re; **F. Lato** means Fiume or River Lato; **R. il Dieci** means Regione or district of Dieci.

1 / 100,000

3. PLATEAU. U. S. The horizontal structure of this region is clearly shown by the grouping of contours along the cliffs. At Y, for example, the thick line indicating the top of the cliff is seen to be made up of a fusion of 6 contours, namely the 7750, which is one of the heavy contours, the next three contours above it, as well as the two contours below it. The cliff is therefore, at least five contour intervals or 250 feet in height at the point Y. In similar manner at X, the six different contours making up this same cliff are again frayed out so that they can be counted. Note in north-central part of map the long narrow wall-like ridge represented by a fusion of contours, although on the map this ridge looks like a heavy contour line running along the crest of the ridge and crossing other contours. This of course could not possibly be the case. Prepare a profile from top of plateau at Y to bottom of canyon, to natural scale. What is the gradient of the main stream? _____ Of the largest tributary? _____ Subdivide the graphic scale to show 500 yard intervals. Do this by construction.

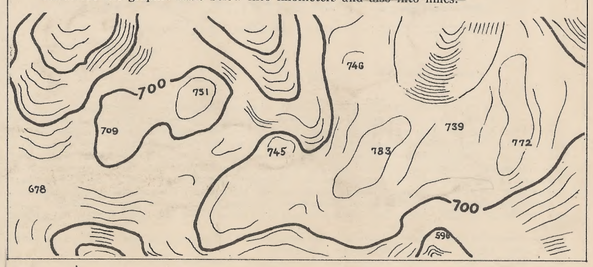


1 / 62,500

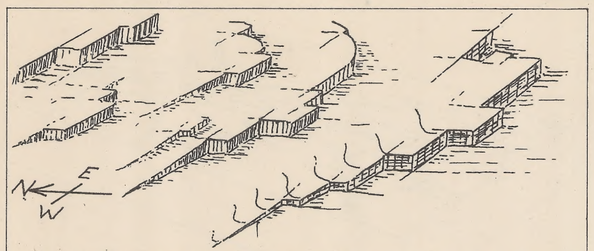
4. PLATEAU. ICELAND. The region shown on this map is a plateau made up of many horizontal lava flows. The various flows produce scarps on the valley walls which conform closely with the contour lines. On your map go over the 100-meter contours wherever they are not obscured by hachures, as suggested below for the southern part of the area. The several spot elevations will assist you in doing this. The northern margin of this plateau has been strongly modified by local glaciers which have produced several large cirques that hang above the main valley, which is now a fjord. A part of it shows in the northeast corner of the map.

Attach a piece of cross-section paper to your map and draw a longitudinal profile along the center of the eastermost of the hanging valleys, called "Baejarhvilft", using a vertical scale of 1/10 inch = 100 meters. What is the vertical exaggeration? _____ Is the transverse profile of these valleys convex or concave? _____ U-shaped or V-shaped? _____

Subdivide the graphic scale below into kilometers and also into miles.

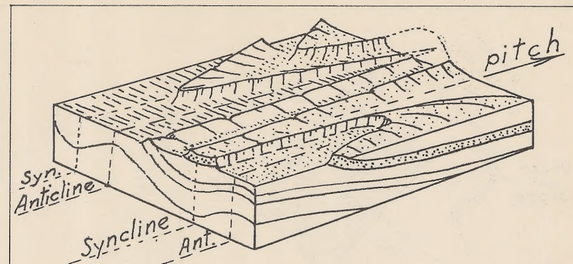


1 / 50,000



9. FAULTING; JOINTING. U. S. This unusual map represents a region of sedimentary formations which have been broken up by two sets of joints running at right angles to each other, the most prominent set being in an east-west direction. The beds dip mainly toward the north but there is at the same time a slight westerly component, which means that the conspicuous E. W. scarps, which mostly face toward the south, become lower and lower toward the west. This northwesterly dip of the beds, then, combined with North-South and East-West joints results in two sets of scarps, one running east and west and facing the south; the other running north and south and facing the east. The student of topographic maps may well give this map unusual attention. Every little bend in every contour must come at just the right place and must line up with the bends in the contours on either side of it. Paste a piece of cross-section paper to the map and draw a N-S profile entirely across the central part of the map, using a vertical scale of 1/20 inch=40 feet. On this profile show the 5 or 6 layers of hard rock dipping toward the north, which produce southward-facing scarps. Subdivide the graphic scale into thousands of feet.

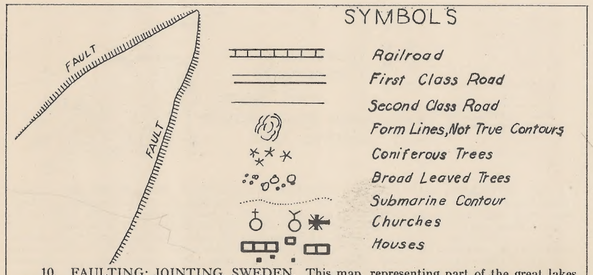
1 / 62,500



11. FOLDED BEDS. U. S. This map represents a typical portion of the Folded Appalachians. Two resistant ridge-making formations with intermediate weaker beds have been bent into symmetrical open folds all of which pitch to the northeast. The erosion of these structures has resulted in the characteristic zig-zag pattern of features. Most of the ridges are steeper on one side than on the other, the gentle slope being down the dip of the beds. The contrast between the abrupt nose of the syncline and the long tapering nose of the anticline is noteworthy. Draw on the map the axes of the two anticlines and two synclines. Put a large arrow on each axis to show direction of **pitch**. Also place a number of small arrows on the map to show dip of beds. Attach a strip of cross-section paper to the map so as to show a profile drawn in a northwest-southeast direction across all the ridges, using a vertical scale of 1/20 inch = 20 feet. (ie. vert. exag. = 13.2)

Subdivide graphic scale into thousands of feet, by construction.

1 / 62,500



SYMBOLS

Railroad
First Class Road
Second Class Road
Form Lines, Not True Contours
Coniferous Trees
Broad Leaved Trees
Submarine Contour
Churches
Houses

10. FAULTING; JOINTING. SWEDEN. This map, representing part of the great lakes region in southern Sweden, shows several straight steep scarps produced by erosion along lines of faulting. On your map indicate position of at least 5 faults by heavy red lines. The topography is represented by hachures as well as by form lines which are designed to show the approximate shape of many of the smaller knobs and glacial hills. Because of glaciation there are many lakes in this region, which on the original are printed in blue, while the topographic forms are depicted by both hachures and form lines in black. What is the approximate height of these scarps? _____ meters or _____ feet. The depths along the coast are shown in meters and the 10-meter depth contour is shown by a dotted line. Note that much of the region is forested, especially the hill tops and that coniferous trees seem to predominate. Subdivide the graphic scale below into both miles and kilometers to conform with the fractional scale of 1 : 100,000 (Note. 1 inch = 2½ cm.). This should be done graphically by similar triangle method, and not by mathematical calculation.

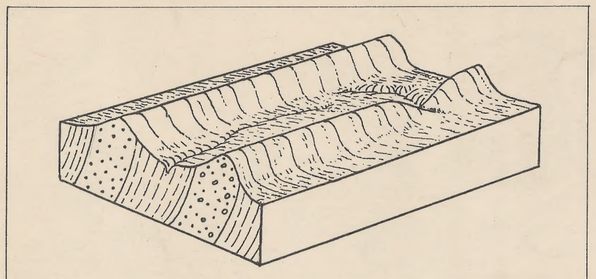
1 / 100,000

Single track Railroad and Station
Double track Railroad over Road
First class paved Highway
unimproved Road
Woods Roads
W.H. Wirtshaus; Tavern or Public House
M.H. Meierhof; Farmhouse
Kapelle; Chapel
Windmill
Triangulation Station
Bench Mark
Trees
Mule track; bridle path

12. FOLDED BEDS. AUSTRIA-HUNGARY. This reproduction is from the map of the old Austro-Hungarian Empire, which covers a large part of central Europe and is stin the best map of that area. The part represented here lies in the folded Carpathians and shows typical ridge and valley topography. The exact structure can not be so readily interpreted as on the corresponding U.S.G.S. map. The original of this is printed in black only, and is reproduced here to actual scale. Note that both hachures and contours are used, the contour interval being 100 M. A number of spot elevations are also shown. This map is profuse with detail and a very large variety of symbols is used. A few are shown above. Locate one of each type upon the map. Attach a strip of cross-section paper to the map and draw a N-S profile entirely across the central part of the map, using a vertical scale of½ inch=100 M. What is the resulting vertical exaggeration? Ans. _____ times. How does the height of these ridges compare with the height of the ridges in the Appalachian area above?

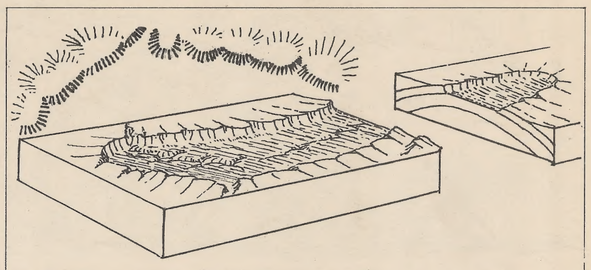
Subdivide graphic scale into miles and kilometers.

1 / 75,000



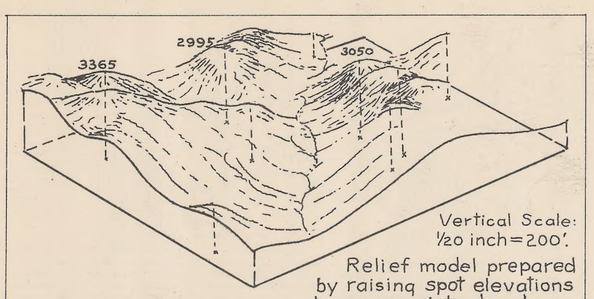
5. TILTED BEDS. U. S. In this region the beds stand vertically. There are two very resistant sandstone formations separated by a much thicker formation of shale which is less resistant to erosion than sandstone. Prepare a N. S. profile almost anywhere through this map, attaching a strip of cross-section paper to the map. Use a vertical scale of 1/20 inch = 100 feet, which gives a vertical exaggeration of (?) _____ times. On your profile draw a geological section, similar to that on the diagram above, to show that at depth the beds dip toward the north and that therefore the beds in the southern part of the map are older than those in the northern part. This map illustrates very distinctly what is meant by **strike**. The strike of a formation is the direction in which its outcrop trends across the country. In this case the strike is said to be East-West. Subdivide the graphic scale below into miles and quarter miles, by construction.

1 / 62,500



7. DOME. U. S. The dome appearing on this map is a relatively small example of a dome structure. The entire crest of the dome has been worn away, thus exposing the weaker underlying beds which have been further eroded to form a basin. This is therefore a structural dome but a topographic basin. On the map there is one great hogback encircling the dome and a suggestion of another hogback in the southeastern corner of the area. Note that the hogback in most places presents a steep scarp inward toward the center of the dome and a gentler slope toward the outside, down the dip of the beds. What is the average height (not elevation) of the scarp? _____ Attach a piece of tracing paper over your map and prepare a simple hachure map after the manner of the small portion shown above, for the northwest corner. Subdivide the graphic scale below into thousands of yards. This may be done by construction without any mathematical computation.

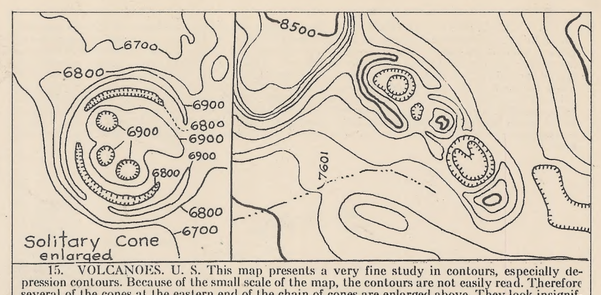
1 / 62,500



Vertical Scale:
1/20 inch=200'.
Relief model prepared by raising spot elevations to appropriate levels.

13. COMPLEX MTNS. U. S. The full-bodied forms of the mountains in this area, which are arranged in no special manner, indicate that this is a region of complex rocks, possibly granite, gneiss, or schist, but certainly not sedimentary beds. The relief of the region is great and all of the streams have very steep gradients. This map lends itself readily to the drawing of a relief model as shown above. Because of the small area it is not necessary to change the vertical scale in different parts of the drawing in order to meet the requirements of perspective. Extend the profiles around the block, add some additional spot elevations and complete the drawing. On the map, determine the areas invisible from hill 2995. Subdivide graphic scale into miles.

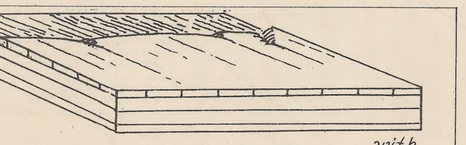
1 / 62,500



15. VOLCANOES. U. S. This map presents a very fine study in contours, especially depression contours. Because of the small scale of the map, the contours are not easily read. Therefore several of the cones at the eastern end of the chain of cones are enlarged above. They look insignificant on the map but you will observe that the end one is at least 300 feet high and that the craters in two of them are at least 100 feet deep. The solitary cone at the western end of the chain has several unique features, notably a cone with three craters, all within a much larger crater which it so completely fills as to leave only two crescent-shaped remnants of the large crater. Note hill 9164 in the middle of the chain. Is the faint irregular line on the top of that cone the outline of a lake or is it a contour line? _____ Enlarge this part of the chain and number each contour. Note also the intermittent streams with distributaries and two lakes held in by terminal moraines at the ends of glacial troughs.

Subdivide scale below into miles by graphic means. Indicate on map above the diameters in feet of the several cones.

1 / 125,000

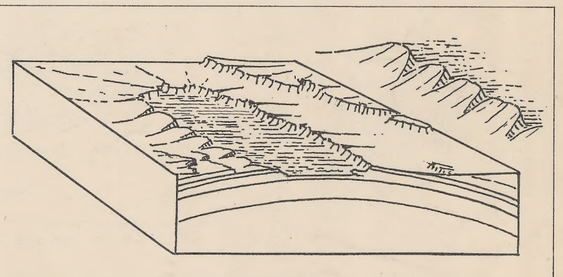


H Hotel
S School
G Garage
C Cemetery
P Post Office
T Telephone Exchange
T Telegraph Office
M Masonry Bridge
CF Cheese Factory
F Blacksmith's Forge

296 303 Main Road (red) with elevations
Secondary (red) at intersections
Telegraph & Telephone Line along Road
Power Line
Double } Railroad
Single }

6. TILTED BEDS. CANADA. In this area the formations are dipping very gently toward the south. The escarpment shown here is a **cuesta** of an ancient coastal plain. It is called the Niagara cuesta, and is the scarp over which the Niagara River drops in its famous falls. Two of the electric power transmission lines cross the map. Several letters are used to designate special cultural objects such as schools, telegraph offices, etc., as indicated above. Similar symbols are used on the British Ordnance maps. In the original this map is printed in several colors, much like the sheets of the U. S. Geological Survey. Note that elevations are indicated along the electric railways at almost every road intersection. Note that the roads are spaced at ¼-mile intervals, in a fairly regular checkerboard pattern, in conformance with the land office survey used in Canada and the United States. They angle up the escarpment, however. Express the scale of this map in inches per mile and subdivide the graphic scale accordingly. _____ Also draw a N-S profile using 1/20 inch = 25 feet. This causes a vertical exaggeration of (?) _____ times.

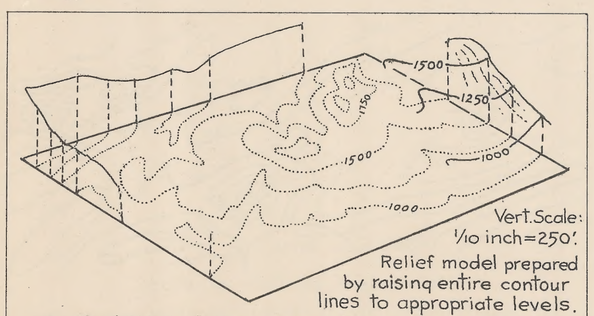
1 / 63,360



8. DOME. MOROCCO. The topography of this map is represented merely by form lines. There are not even any spot elevations. It is obviously only a reconnaissance map. The small scale indicates that the representation of details is not attempted. This structural dome, like that from the United States, shown above, has been eroded to form a topographic basin. Complete the drawing above to illustrate the essential features of the region. A part of a second outer encircling hogback appears at the northeast and southwest corners of the map. The expression "Hammada très ravinée" means "a much dissected stony upland or desert".

Subdivide the graphic scale below into miles, and also into kilometers.

1 / 200,000



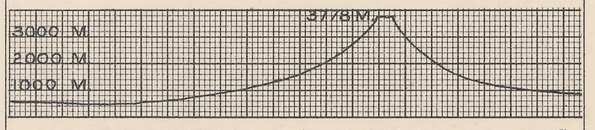
Vert. Scale:
1/10 inch=250'.
Relief model prepared by raising entire contour lines to appropriate levels.

14. COMPLEX MTNS. BRITAIN. This map, originally printed with brown hachures and red contours, represents a type of topography much like that on the map just above. As reproduced here the numbers on the contours are hard to read. Below 1000 feet they are spaced at 100-foot intervals. Above 1000 feet the interval is 250 feet. With this help, number all of the contours conspicuously. What is the total relief in this area, i. e. the difference in elevation between the lowest and the highest points? _____ Using the above block prepare a relief drawing like that shown for the previous map. The vertical scale is to be 1/10in. = 250 feet. Try to show as much detail as possible. Subdivide graphic scale to show miles and eighths of miles.

1 / 63,360

Japanese Terms

On Map		Others	
Yama;	Mountain	Kita;	North
Ko;	Lake	Nishi;	West
Shiro;	Castle	Shi;	Town
Higashi;	East	Kawa;	River
Minami;	South	Shima;	Island



16. VOLCANO. JAPAN. This large volcanic cone is noted for its unusual symmetry. The closer spacing of the contours near the top of the peak than near the base indicates its concave profile, as shown above. What is the vertical exaggeration of this profile? Ans. _____ The contours on this map are not numbered and the contour interval is 40 meters.

Although Fujiyama is the dominating feature on this map, there are numerous other smaller volcanic cones, most of them in various stages of dissection. The development of these cones, together with lava flows, has caused the formation of lakes by damming up rivers, as in the northwest corner of the area.

The highest point on the rim of Fujiyama is given on the map as 3778 M. A meter is 39.37 inches. What is the elevation of this peak in feet above sea level? _____

Subdivide the scale below into miles and also into kilometers. (1 inch = 2½ cm. approx.).

1 / 200,000

NOTE. The explanations on this sheet are arranged in the same way as the respective maps are on the accompanying sheet. Answers to all questions and problems are to be placed on this sheet and on the map sheet. No other paper is necessary except small pieces of cross-section paper to be attached to some of the maps. The U.S.G.S. maps on accompanying sheet are reproduced by permission of War Department and U. . Geological Survey.

The Geographical Press, Columbia University, New York

8.18-27a

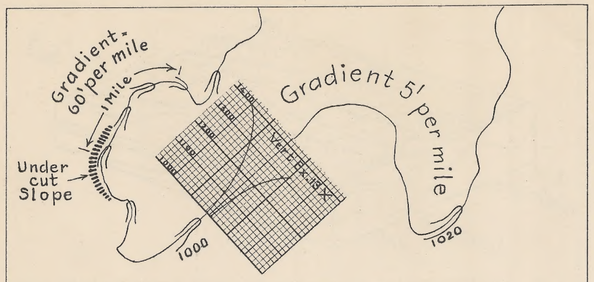
DESTRUCTIONAL FORMS

EXPLANATIONS AND PROBLEMS Based on Accompanying Sheet of

TOPOGRAPHIC MAPS

SHOWING

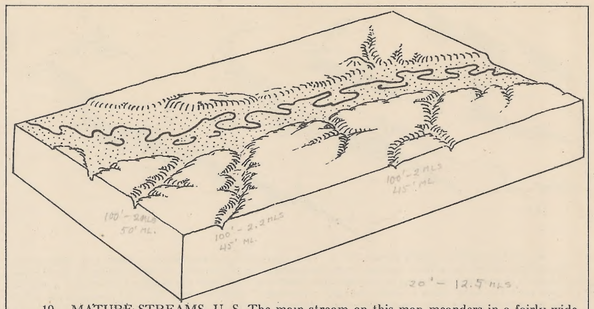
REPRESENTATIVE EXAMPLES



17. STREAMS; YOUNG. U. S. The original of this map, as in the case of all the U.S.G.S. maps, is printed with brown contours and blue streams. Go over the streams with blue (stream lining). Go over ridge crests in brown, (ridge lining). Note that the main stream is crossed by the 1000-foot and the 1020-foot contours, spaced about four miles apart. The gradient is therefore 5 feet per mile. The gradient of the tributary on the north is 60 feet per mile. What is the gradient of the stream entering from the south? _____ The cross-section of the main stream is V-shaped and is a good example of a convex slope.

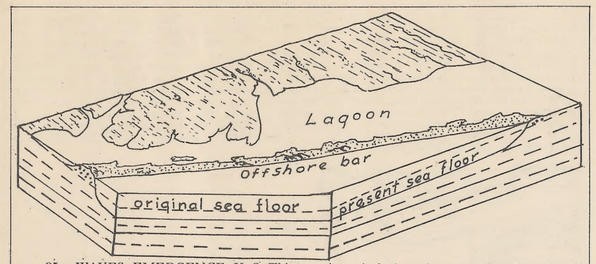
Subdivide the graphic scale below into miles.

1 / 62,500



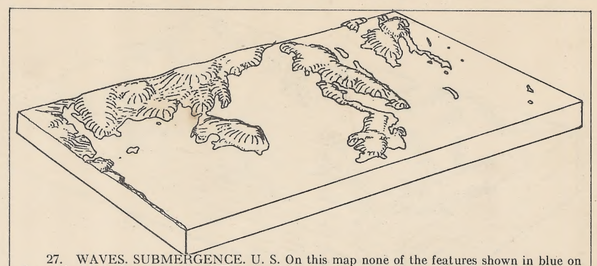
19. MATURE STREAMS. U. S. The main stream on this map meanders in a fairly wide flat-floored valley. It is a typical mature stream with many cut-offs, some shown by depression contours; and there are also several places where cut-offs are imminent. Point out two of these on the map. In which direction does this main stream flow? _____ It is crossed by only one contour, at its eastern end. What is the elevation of the contour which follows the stream for most of its length? _____ What is the gradient of this stream, assuming that it crosses the 1520-foot contour just off the map, in feet per mile? _____ What is the average gradient of the major tributaries? _____ Complete the above diagram. Subdivide the scale below into miles and kilometers. 1 km. = 5/8 mi. approx. Therefore how many kilometers does 1 mile represent? _____

1 / 62,500



25. WAVES. EMERGENCE. U. S. This map is typical of much of the Atlantic and Gulf coasts of the United States. Because the land slopes off very gently toward the sea the waves break offshore and build barrier bars or offshore bars which are separated from the mainland by a lagoon or bay. Waves occasionally break over the bar in times of winter storms and during hurricanes, and carry material landward into the bay to form overwash delta deposits. The bar is therefore very irregular on its inner side. The diagram above shows that the profile of the shore has been altered by wave action so that the waves are able to approach nearer to the land and break directly against the bar. This will in time be pushed back onto the mainland and thus completely destroyed. On the map, add cultural features such as highways of different types, a railroad crossing the lagoon with a draw bridge at one point, houses, and coast guard stations. Show submarine contours at 2, 4, 6, and 10 meter depths, both in the lagoon and offshore, as on the German map below. Change the meter readings to nearest fathoms and label accordingly (one fathom = 6 feet). Subdivide the scale below into miles, and also into kilometers.

1 / 125,000



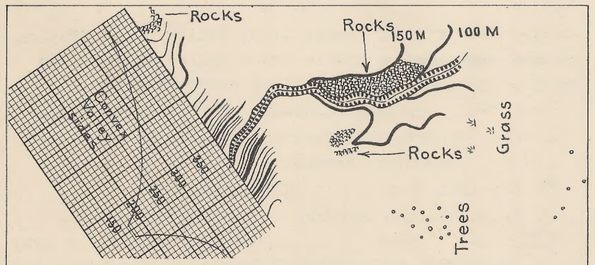
27. WAVES. SUBMERGENCE. U. S. On this map none of the features shown in blue on the original have been reproduced. The actual shoreline or zero contour, therefore, is missing. As it shows faintly in places, it will not be difficult to add this line to the map, preferably in blue ink, together with a few small streams. While doing this, the student should add the following shore features in appropriate places, and label them: 1. simple spit; 2. recurved spit; 3. compound spit; 4. complex spit; 5. bay-head bar; 6. mid-bay bar; 7. baymouth bar; 8. cuspate bar; 9. simple tombolo; 10. complex tombolo.

Place appropriate spot elevations upon each of the prominent hills.

Complete the diagram above, using vertical scale of 1/10 inch = 100 feet.

Place a piece of cross-section paper along the N-S line in eastern part of map and draw a profile with vertical scale 1/20 inch = 100 feet. What vertical exaggeration does this represent? _____ Determine land area of this map in square miles by tracing off the outline of the land and then place your tracing over a sheet of cross-section paper and count the squares. Convert to actual distances by use of graphic scale, which should be subdivided into miles, and fractions thereof.

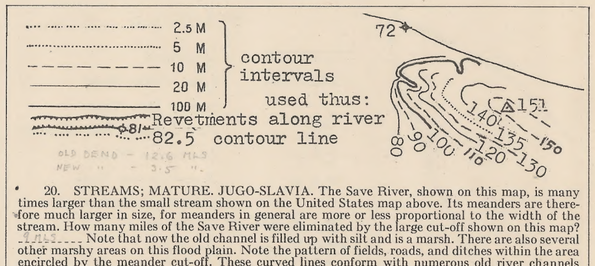
1 / 62,500



18. STREAMS; YOUNG. GREECE. The original of this map is printed in black only. Because of the fairly large contour interval (10 M.) and the large scale of the map (about 3 inches to one mile), the contours are in most places separated from each other and are easily read. The 50-meter contours are printed heavy. Number them appropriately on the map. Hachures are used to show the sharply cut gorge in the bottom of the main valley. The main stream has a strong but not uniform gradient. It is greatest where the stream cuts across a mass of hard rock. There it crosses two 50 M. contours in what distance? _____ How many feet of slope per mile is this? _____ Rocky outcrops are shown by a special pattern along the sides of the gorge, as well as elsewhere on the map. The mountain tops are covered by trees, shown by little circles and most of the mountain sides are covered by grass, shown by a special symbol.

Subdivide the graphic scale into kilometers and into thousands of feet.

1 / 20,000



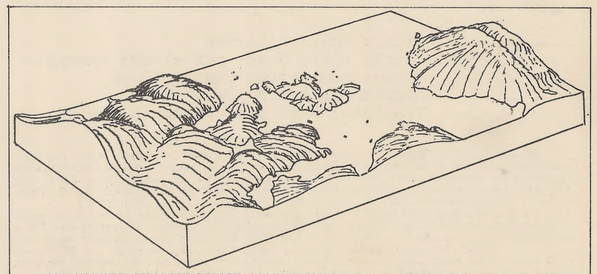
20. STREAMS; MATURE. JUGO-SLAVIA. The Save River, shown on this map, is many times larger than the small stream shown on the United States map above. Its meanders are therefore much larger in size, for meanders in general are more or less proportional to the width of the stream. How many miles of the Save River were eliminated by the large cut-off shown on this map? _____ Note that now the old channel is filled up with silt and is a marsh. There are also several other marshy areas on this flood plain. Note the pattern of fields, roads, and ditches within the area encircled by the meander cut-off. These curved lines conform with numerous old river channels representing different stages in the development of the meander. Most flood plains are thus scarred by such meander scrolls. Draw on the map with a heavy blue line the course of the Save River before the cut-off occurred. Indicate by a dotted blue line where the next cut-off is likely to take place. Put arrows on the map to show the direction in which the Save River is flowing.

The original of this map is printed in color: the contours in brown, the rivers in blue, and the culture in black. The contours are shown at 2, 5, 10, 20 and 100 meters above the sea, each contour being expressed by a different symbol, as illustrated above. On the map, the 2-meter and the 5-meter contours may be distinguished on the meander spurs.

Numerous spot elevations in meters are shown on the map. In spite of its small scale the map gives many details, such as houses and fields, churches, bench marks, anchorages, navigation lights, dikes and embankments, and other cultural objects.

Subdivide the scale below into kilometer and miles.

1 / 100,000



26. WAVES. EMERGENCE. GERMANY. This map illustrates the same kind of features as the map directly above. The original is printed in black only and shows a large amount of useful information. Some of the symbols employed on German maps are indicated above. In addition, the translation of some of the names and abbreviations used on this particular map is as follows: **Kgl. Schmelz** means **Königliche** or royal smelter; **Schmelz od. Schmeltelle** means **Schmelz oder Schmelzstelle** or smeltingplace; **Schmelz** is also the name of the town; **Schule** means school; **Schanze** means earthwork; **Ehemal. Bernst. Baggerei** means former amber dredgery; **Post-expedition** means mail landing; **Hafen** means harbor; **Hst.** means **Haltestelle** or stopping place or railroad station; **Forst** means forest; **Bernstein Gruben** means amber mines; **Libis B.** means **Bge.** or **Berge** or hills; **Schweine rucken** means pig's back, a popular name for this submerged ridge.

By means of several tints color the areas between the submarine contours so as to emphasize the various depths, which are expressed in meters.

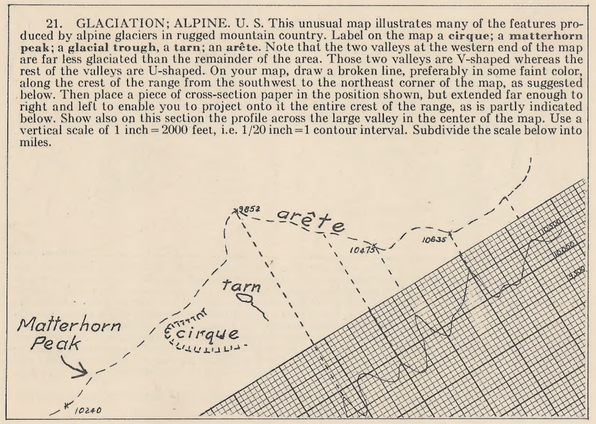
1 / 100,000

28. WAVES. SUBMERGENCE. NORWAY. This embayed coast is far more rugged than that part of the United States shown above. If you place a piece of cross-section paper along the line connecting the two highest hills on the map and draw a profile with a vertical scale of 1/20 inch = 50 meters, you will be enabled to make a fair comparison between the two regions. The vertical exaggeration which you adopt here will be about the same as that which you adopted on the cross-section for the map above. Explain why this is so. Complete the diagram above.

The original of this Norwegian map shows the contours as well as the streams in black and the water in solid blue. The relief is emphasized on the original map by a very pronounced shading in brown applied to all the slopes. The steeper the slopes, the heavier is the shading. The light is imagined as coming from above and therefore the effect is somewhat the same as that produced by using a greater number of contours.

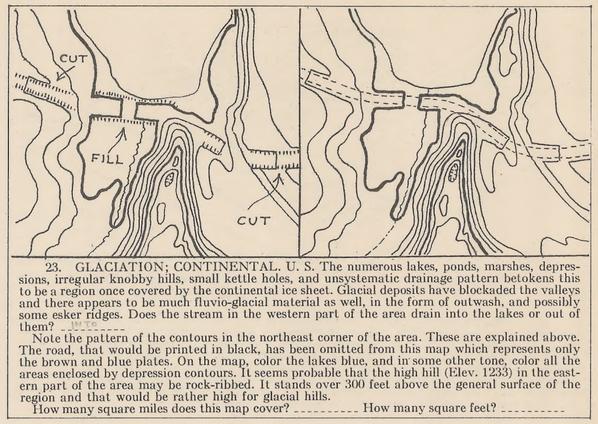
Subdivide the scale below into miles and also into Kilometers.

1 / 100,000



21. GLACIATION; ALPINE. U. S. This unusual map illustrates many of the features produced by alpine glaciers in rugged mountain country. Label on the map a **cirque**; a **matterhorn peak**; a **glacial trough**, a **tarn**; an **arête**. Note that the two valleys at the western end of the map are far less glaciated than the remainder of the area. Those two valleys are V-shaped whereas the rest of the valleys are U-shaped. On your map, draw a broken line, preferably in some faint color, along the crest of the range from the southwest to the northeast corner of the map, as suggested below. Then place a piece of cross-section paper in the position shown, but extended far enough to right and left to enable you to project onto it the entire crest of the range, as is partly indicated below. Show also on this section the profile across the large valley in the center of the map. Use a vertical scale of 1 inch = 2000 feet, i.e. 1/20 inch = 1 contour interval. Subdivide the scale below into miles.

1 / 125,000

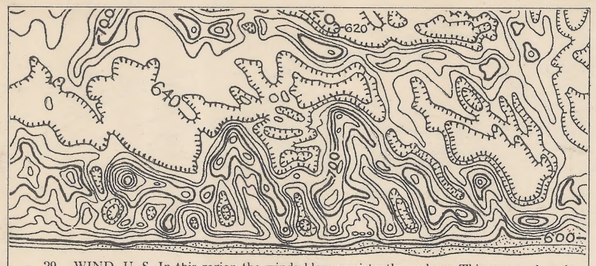


23. GLACIATION; CONTINENTAL. U. S. The numerous lakes, ponds, marshes, depressions, irregular knobby hills, small kettle holes, and unsystematic drainage pattern betokens this to be a region once covered by the continental ice sheet. Glacial deposits have blockaded the valleys and there appears to be much fluvio-glacial material as well, in the form of outwash, and possibly some esker ridges. Does the stream in the western part of the area drain into the lakes or out of them? _____

Note the pattern of the contours in the northeast corner of the area. These are explained above. The road, that would be printed in black, has been omitted from this map which represents only the brown and blue plates. On the map, color the lakes blue, and in some other tone, color all the areas enclosed by depression contours. It seems probable that the high hill (Elev. 1233) in the eastern part of the area may be rock-ribbed. It stands over 300 feet above the general surface of the region and that would be rather high for glacial hills.

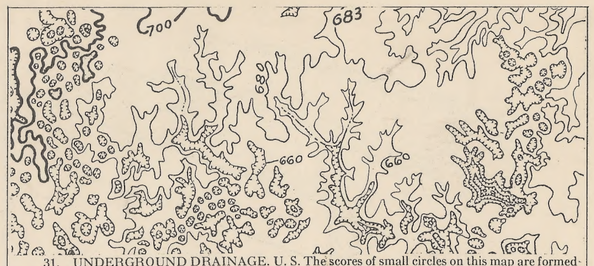
How many square miles does this map cover? _____ How many square feet? _____

1 / 62,500



29. WIND. U. S. In this region the winds blow persistently onshore. This means that the dunes migrate inland. Like most dunes they present their steep slopes away from the wind. The sand is blown up the gentle slope of the dune and drops on the leeward side where it assumes a fairly steep angle, about 35 degrees, called the angle of repose. The dunes nearest the shore are stretched out more or less in the direction of the wind. They are said to be longitudinal whereas those farther inland are transverse. Note that there are many depressions among the dunes, shown by depression contours. Dune topography is easily distinguished from glacial topography like that on the map to the left, because it does not have so many small pimple-like hills; and it is different from sink hole topography like the map to the right in that it does not have so many very small round pits. Because of the paucity of heavy contours on this map, some of the lighter ones are numbered. An enlarged portion is shown above. Number all the contours and give appropriate spot elevations for the tops of the dunes and the bottoms of the depressions. How wide is this belt of dunes in hundreds of feet? _____

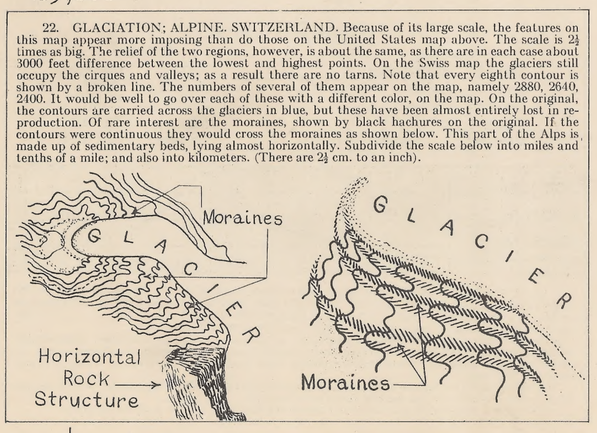
1 / 62,500



31. UNDERGROUND DRAINAGE. U. S. The scores of small circles on this map are formed by depression contours. None of them are hills. They are all sink-holes, for this is a limestone country. Some of the sinks are quite large and have branches like a stream. They are called valley sinks. The small ponds printed in blue on the original can not readily be distinguished on this map. The depressions with black centers are probably filled with ponds. The large valley sink in the eastern part of the area is enclosed by three depression contours. What is its depth? _____ Indicate on the map at least two disappearing streams. On the enlarged portion of the map shown above indicate the elevation of the various contours and depression contours. Does there seem to be any pattern in the alignment of the depressions on the map and if so what do you think is the cause? _____ On the map above, add: (1) a depression which is a little over 25 feet deep; (2) a depression which is 15 feet deep; (3) a depression which is 50 feet deep; (4) a depression which is 75 feet deep.

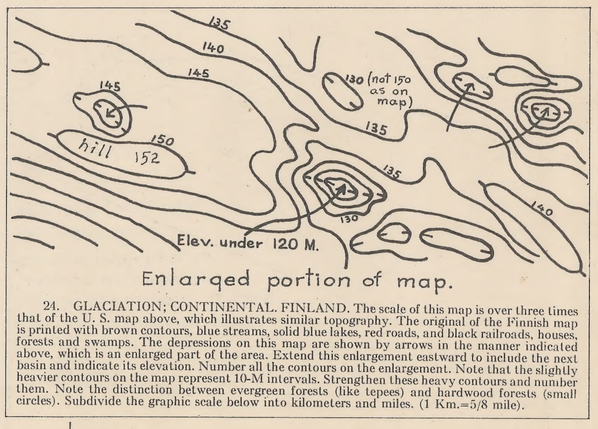
What is the approximate diameter of the smallest depressions on the map in feet? _____

1 / 62,500



22. GLACIATION; ALPINE. SWITZERLAND. Because of its large scale, the features on this map appear more imposing than do those on the United States map above. The scale is 2½ times as big. The relief of the two regions, however, is about the same, as there are in each case about 3000 feet difference between the lowest and highest points. On the Swiss map the glaciers still occupy the cirques and valleys; as a result there are no tarns. Note that every eighth contour is shown by a broken line. The numbers of several of them appear on the map, namely 2880, 2640, 2400. It would be well to go over each of these with a different color, on the map. On the original, the contours are carried across the glaciers in blue, but these have been almost entirely lost in reproduction. Of rare interest are the moraines, shown by black hachures on the original. If the contours were continuous they would cross the moraines as shown below. This part of the Alps is made up of sedimentary beds, lying almost horizontally. Subdivide the scale below into miles and tenths of a mile; and also into kilometers. (There are 2½ cm. to an inch).

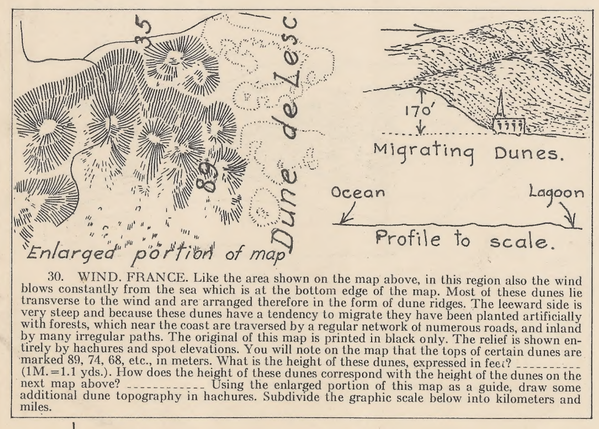
1 / 50,000



24. GLACIATION; CONTINENTAL. FINLAND. The scale of this map is over three times that of the U. S. map above, which illustrates similar topography. The original of the Finnish map is printed with brown contours, blue streams, solid blue lakes, red roads, and black railroads, houses, forests and swamps. The depressions on this map are shown by arrows in the manner indicated above, which is an enlarged part of the area. Extend this enlargement eastward to include the next basin and indicate its elevation. Number all the contours on the enlargement. Note that the slightly heavier contours on the map represent 10-M intervals. Strengthen these heavy contours and number them. Note the distinction between evergreen forests (like tepees) and hardwood forests (small circles). Subdivide the graphic scale below into kilometers and miles. (1 Km. = 5/8 mile).

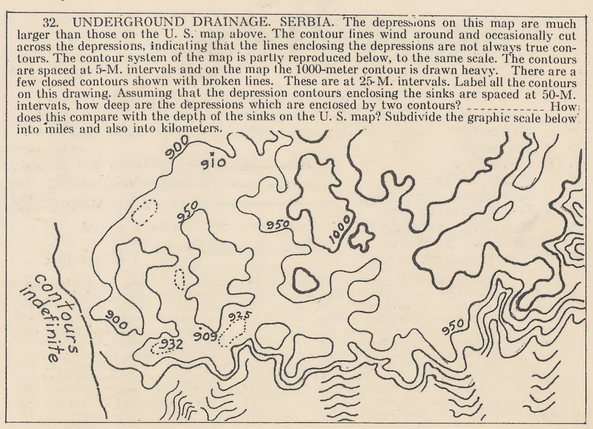
1 / 20,000

NOTE. The explanations on this sheet are arranged in the same way as the respective maps are on the accompanying sheet. Answers to all questions and problems are to be placed on this sheet and on the map sheet. No other paper is necessary except small pieces of cross-section paper to be attached to some of the maps. The U.S.G.S. maps on accompanying sheet are reproduced by permission of War Department and U. S. Geological Survey.



30. WIND. FRANCE. Like the area shown on the map above, in this region also the wind blows constantly from the sea which is at the bottom edge of the map. Most of these dunes lie transverse to the wind and are arranged therefore in the form of dune ridges. The leeward side is very steep and because these dunes have a tendency to migrate they have been planted artificially with forests, which near the coast are traversed by a regular network of numerous roads, and inland by many irregular paths. The original of this map is printed in black only. The relief is shown entirely by hachures and spot elevations. You will note on the map that the tops of certain dunes are marked 89, 74, 68, etc., in meters. What is the height of these dunes, expressed in fee.? _____ (1M. = 1.1 yds.). How does the height of these dunes correspond with the height of the dunes on the next map above? _____ Using the enlarged portion of this map as a guide, draw some additional dune topography in hachures. Subdivide the graphic scale below into kilometers and miles.

1 / 80,000



32. UNDERGROUND DRAINAGE. SERBIA. The depressions on this map are much larger than those on the U. S. map above. The contour lines wind around and occasionally cut across the depressions, indicating that the lines enclosing the depressions are not always true contours. The contour system of the map is partly reproduced below, to the same scale. The contours are spaced at 5-M. intervals and on the map the 1000-meter contour is drawn heavy. There are a few closed contours shown with broken lines. These are at 25-M. intervals. Label all the contours on this drawing. Assuming that the depression contours enclosing the sinks are spaced at 50-M. intervals, how deep are the depressions which are enclosed by two contours? _____ How does this compare with the depth of the sinks on the U. S. map? Subdivide the graphic scale below into miles and also into kilometers.

1 / 75,000

8-18-27

The Geographical Press, Columbia University, New York